

# Important Advances in Clinical Medicine

## *Epitomes of Progress—Ophthalmology*

*The Scientific Board of the California Medical Association presents the following inventory of items of progress in ophthalmology. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist the busy practitioner, student, research worker or scholar to stay abreast of these items of progress in ophthalmology which have recently achieved a substantial degree of authoritative acceptance, whether in his own field of special interest or another.*

*The items of progress listed below were selected by the Advisory Panel to the Section on Ophthalmology of the California Medical Association and the summaries were prepared under its direction.*

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### **Diagnostic Ophthalmic Ultrasonography**

DIAGNOSTIC ULTRASONOGRAPHY, of great value in clinical ophthalmology, is used frequently to differentiate intraocular lesions, particularly in cases of retinal detachment, tumor or vitreous hemorrhage. When the posterior segment cannot be seen because of corneal opacity, cataract or a miotic pupil, ultrasound testing provides the most dependable method for investigation. Contact B-scan units are more practical for posterior segment pathology; however, the lens, iris and ciliary body can be studied by holding the transducer in a water bath placed over the eye. The B-scan device provides a visible cross-section of the eye that is helpful in orientation, and the A-scan unit gives additional details of tumors and assists in the differential diagnosis of retinal detachment and vitreous membranes. Both A-scan and B-scan ultrasonographic units are highly reliable in diagnosing intraocular tumors.

A-scan and B-scan ultrasonography is useful for detecting and localizing foreign bodies. However, in some cases where the foreign body is small or located near the scleral wall, the findings may

not be conclusive. Therefore, standard x-ray views of the eye and orbit should be obtained if a foreign body is suspected, and, in many cases, the traditional method of x-ray localization is still indicated.

B-scan ultrasound testing is of remarkable value with cystic orbital lesions such as mucocoeles and dermoids. A-scan and B-scan ultrasonography can also be very useful in cases of endocrine exophthalmos, where enlargement of the extraocular muscles is frequently found. Pseudotumor and other solid orbital tumors can be detected with A-scan and B-scan ultrasound testing. Recent refinements of computed tomography—both computed axial tomography (CAT) and computed coronal tomography (CCT), have established that this latter technique is of greater value in demonstrating some orbital tumors. Standardized A-scan ultrasound testing, however, can be of more assistance in determining the type of tumor once the size and location are known.

A-scan ultrasound equipment has been designed and calibrated for the accurate measurement of axial lengths to calculate lens power. Measurements are made by photographing the A-scan with a superimposed scale that is calibrated in micro-

seconds. The millimeters of axial length can be determined by using tables that take into account the speed of sound transmission in aqueous, vitreous and the lens. A-scan units having digital read-out screens are much easier and quicker to use, although the accuracy of both methods is comparable.

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## Major Ocular Trauma

OCULAR TRAUMA remains one of the leading causes of blindness, particularly in younger persons. The results of treatment of injuries to the anterior structures of the eye have improved dramatically primarily because of the use of microsurgical techniques and postoperative topical steroids. However, injuries involving the posterior portion of the eye, such as the vitreous and retina, continue to have a poor prognosis because of the high incidence of retinal detachment.

A posterior penetrating eye injury is often complicated by vitreous hemorrhage, which is a potent stimulus to inflammation. The reparative process is characterized by proliferation of fibroblasts and, as in other parts of the body, contractile myofibroblasts, which are cells with smooth-muscle characteristics. While this repair process is beneficial for the skin and other organs, it can be harmful to the eye, primarily because of the anatomical relationship of the vitreous and retina anteriorly. The myofibroblasts use condensations of the incarcerated vitreous as a scaffold to form transvitreal and epiretinal membranes, which later contract and cause traction on the retina, eventually leading to traction retinal detachment.

With pars plana vitrectomy, this proliferative process may be interrupted and many cases, previously considered inoperable, can now be salvaged. Vitrectomy is carried out using a small cutting and sucking instrument of less than 1 mm in diameter that is introduced into the vitreous cavity just anterior to the retina. An infusion of physiological solution maintains the intraocular volume and, thus, complex manipulations inside the eye are possible.

Penetrating ocular injuries must be repaired promptly. If the presence of an intraocular foreign body is suspected preoperatively, it must be identified using x-ray studies and then localized by

computerized tomography (CT scan) or ultrasonography. At the time of primary repair, corneal and scleral lacerations are sutured, using microsurgical techniques. A severely disrupted lens may be removed at the same time, but if the injury involves the posterior ocular structures, the ophthalmologist should confine the primary repair to meticulous surgical wound cleansing and precise closure. An extensive posterior vitrectomy is delayed until the time of the second reconstruction, some 7 to 10 days after injury. By this time, the risk of intraocular bleeding has lessened and alterations in vitreous anatomy make vitrectomy technically easier.

The surgical objectives at this stage are to remove opacities such as vitreous hemorrhage or a cataractous lens, to peel and segment vitreous traction membranes, to remove nonmagnetic or impacted intraocular foreign bodies and to identify and treat retinal holes or detachment. If the retina is detached, the infused fluid in the vitreous cavity may be exchanged with air or a sulfur hexafluoride (SF<sub>6</sub>) gas/air mixture to provide an effective retinal tamponade.

Vitrectomy has become an established mode of treatment for severe ocular injuries. While primary repair remains the domain of a general ophthalmologist, vitrectomy is a time-consuming operation, requiring complex instrumentation and experienced personnel and is best done in a center with special expertise in vitreous procedures.

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## Danger With Eyedrops

EYE SOLUTIONS, suspensions and ointments are the most common methods of delivering medication to the conjunctiva, cornea and anterior chamber. These medications range from simple decongestants to potent antimicrobial or corticosteroid drugs. Eyedrops can be crucial in the treatment of serious eye disease; however, their misuse can be harmful to the eyes.

For proper administration of eyedrops, the patient should look up with the head tilted back slightly. When the lower lid is pulled away from the eyeball, the drop is placed inside the lower lid and the patient is advised to blink gently *without* squeezing the lids closed. The patient should blot